

SHUTTLE FLIGHT HISTORIES
ORBITER MASS PROPERTIES

Miss. Seq. No.	STS- No.	Orb. OV-	Lift-off Weight, lb			Pre-Deorbit burn Weight, lb			Entry Interface Weight, lb			Mach 3 Weight, lb			Landing Weight, lb			Ferry Weight, lb		
			CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z
1	1	102	219,440.7			202,769.9			196,868.7			195,942.7			195,472.7			197,023		
			1125.2	0.2	379.7	1108.4	0.1	376.1	1099.0	0.2	373.1	1096.7	0.2	372.4	1098.1	0.2	369.6	1120.7	0.3	371.0
2	2	102	230,938.9			215,530.2			206,842.5			204,355.5			204,262.5			206,455.0		
			1120.6	0.1	379.8	1106.1	0.3	377.1	1100.5	0.2	373.8	1096.6	0.2	372.3	1098.1	0.2	369.7	1116.0	0.1	372.7
3	3	102	235,556.1			214,949.6			208,790.2			207,349.2			207,072.9			211,200		
			1119.2	-0.5	379.4	1106.3	-0.5	376.1	1097.9	-0.5	373.3	1095.4	-0.5	372.4	1096.9	-0.5	369.8	1117.8	-0.4	373.5
4	4	102	241,772.0			218,163.6			211,184.0			209,140.5			208,946.8			214,526		
			1122.2	-0.3	381.8	1106.6	-0.5	377.7	1096.2	-0.5	374.5	1092.9	-0.5	373.3	1094.4	-0.5	370.7	1114.5	-0.4	375.0
5	5	102	247,112.9			209,890.1			203,775.9			202,642.7			202,480.3			205,727		
			1116.3	1.1	379.7	1105.0	1.0	374.5	1096.6	1.0	371.6	1094.8	1.0	371.0	1096.3	1.0	368.3	1118.4	1.0	371.9
6	6	099	256,928.1			197,427.8			191,384.2			190,627.2			190,330.2			191,966		
			1127.8	0.5	382.9	1111.2	0.3	374.6	1101.2	0.3	371.5	1099.7	0.4	370.9	1101.2	0.4	368.0	1131.4	0.4	371.9
7	7	099	249,362.7			211,737.0			204,983.4			204,340.4			204,043.4			204,576		
			1123.6	-0.2	381.2	1102.0	-0.6	376.5	1091.3	-0.6	373.3	1089.8	-0.6	372.8	1091.2	-0.6	370.1	1119.6	-0.6	373.6
8	8	099	242,912.3			212,911.0			205,243.4			204,141.4			203,945.4			205,874		
			1124.5	0.2	382.0	1098.2	-0.1	376.7	1092.5	-0.1	373.8	1090.4	-0.1	373.0	1091.9	-0.1	370.4	1119.4	-0.2	374.3
9	9	102	247,807.3			227,648.0			221,143.4			220,288.4			220,027.4			219,910		
			1109.7	-0.1	379.0	1097.0	0.0	376.6	1087.3	-0.1	373.7	1085.8	-0.1	373.2	1087.1	-0.1	370.7	1113.4	0.0	374.1

NA/DOD = Not Available/Department of Defense Mission

Source: JSC/VF Orbiter Mass Properties Summary

STS-1 and subsequent mission.

SHUTTLE FLIGHT HISTORIES ORBITER MASS PROPERTIES

Miss. Seq. No.	STS- No.	Orb. OV-	Lift-off Weight, Ib			Pre-Deorbit burn Weight, Ib			Entry Interface Weight, Ib			Mach 3 Weight, Ib			Landing Weight, Ib			Ferry Weight, Ib		
			CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z
10	10	099	250,482.7			209,746.1			202,966.5			201,528.5			201,238.5			N/A - KSC Landing		
			1124.5	0.2	381.5	1101.4	1.2	375.8	1090.7	1.3	372.6	1087.9	1.3	371.6	1089.3	1.3	368.8			
11	41C	099	254,554.7			208,206.4			198,072.8			197,169.8			196,975.8			198,830		
			1113.4	0.2	383.4	1117.4	-0.1	376.5	1101.8	-0.1	371.6	1100.0	-0.1	371.0	1101.6	-0.1	368.2	1130.9	-0.1	372.4
12	41D	103	263,477.4			211,075.1			203,382.5			202,316.5			201,674.5			202,366		
			1118.0	0.0	382.8	1100.0	-0.1	376.6	1093.4	-0.2	373.5	1090.7	-0.1	372.6	1091.7	-0.2	369.6	1121.8	-0.2	373.8
13	41G	099	242,790.8			209,799.7			203,651.1			202,829.1			202,266.1			N/A KSC Landing		
			1119.0	-0.1	381.7	1093.5	-0.2	374.6	1085.4	-0.2	371.9	1083.7	-0.2	371.3	1084.8	-0.1	368.4			
14	51A	103	263,324.6			215,715.3			209,163.7			207,982.7			207,505.7			N/A KSC Landing		
			1120.9	-0.1	382.6	1090.2	-0.2	375.2	1083.4	-0.2	372.5	1081.4	-0.2	371.8	1082.6	-0.1	369.1			
15	51C	103	NA/DOD			NA/DOD			NA/DOD			NA/DOD			NA/DOD			N/A KSC Landing		
16	51D	103	250,891.6			209,102.8			199,742.2			198,167.2			198,014.2			N/A KSC Landing		
			1126.5	-0.1	381.7	1110.6	-0.2	377.0	1095.8	-0.1	372.5	1092.7	-0.1	371.3	1094.3	-0.1	368.6			
17	51B	099	247,291.3			226,859.0			214,787.4			213,795.4			213,499.4			213,363		
			1114.2	-0.2	381.4	1096.7	-0.3	378.0	1085.7	-0.3	373.4	1084.1	-0.3	372.8	1085.4	-0.3	370.3	1114.8	-0.2	373.8
18	51G	103	256,421.9			213,105.0			205,624.4			204,321.4			204,169.4			204,387		
			1109.6	0.2	379.6	1091.5	-0.2	375.2	1084.3	0.0	372.2	1082.1	0.0	371.4	1083.7	0.0	368.8	1114.2	0.0	372.9

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ORBITER MASS PROPERTIES

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			CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z
19	51F	099	252,628.9			225,398.0			218,227.4			216,894.4			216,735.4			217,564.7		
			1111.6	-0.4	381.8	1091.1	-0.5	376.3	1082.3	-0.6	373.4	1079.8	-0.6	372.5	1081.3	-0.6	370.0	1109.5	-0.5	373.9
20	51I	103	262,309.7			207,794.8			197,824.4			196,856.4			196,674.4			197,259.3		
			1121.3	0.5	382.5	1110.0	0.2	376.7	1094.4	0.2	371.9	1092.4	0.3	371.3	1094.2	0.3	368.5	1124.9	0.3	372.7
21	51J	104	NA/DOD			NA/DOD			NA/DOD			NA/DOD			NA/DOD			191,623		
22	61A	099	243,762.5			223,317.8			215,255.4			214,325.4			214,171.4			214,138.3		
			1109.0	-0.1	380.4	1091.8	-0.4	377.1	1085.5	-0.4	374.2	1083.8	-0.4	373.6	1085.2	-0.4	371.1	1116.4	-0.3	374.5
23	61B	104	261,610.1			213,335.8			206,187.4			205,880.4			205,732.4			205,682.3		
			1110.3	-0.0	379.3	1096.9	-0.1	375.3	1085.8	-0.2	372.0	1084.4	-0.1	371.5	1085.9	-0.1	368.9	1118.0	-0.1	373.2
24	61C	102	256,003.0			221,485.8			211,194.4			210,325.4			210,161.4			210,430		
			1110.3	0.4	380.3	1096.1	0.4	375.7	1085.2	0.4	371.4	1083.6	0.4	370.9	1085.1	0.4	368.3	1114.9	0.5	373.2
25	51L	099	268,829.6			N/A			N/A			N/A			N/A			N/A		
			1119.1	-0.2	384.0															
26	26	103	254,606.5			202,676.3			194,985.3			194,347.3			194,184.3			193,936		
			1118.4	0.3	380.6	1104.7	0.1	374.6	1097.9	0.2	371.4	1096.6	0.2	371.0	1098.3	0.2	368.2	1131.8	-0.1	372.0
27	27	104	NA/DOD			200,752.5			192,095.3			191,105.3			190,956.3			191,337.7		
						1107.9	-0.9	374.6	1095.2	-0.9	370.3	1093.4	-0.9	369.7	1095.1	-0.9	366.8	1127.1	-0.9	370.8

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ORBITER MASS PROPERTIES

Miss. Seq. No.	STS- No.	Orb. OV-	Lift-off Weight, lb			Pre-Deorbit burn Weight, lb			Entry Interface Weight, lb			Mach 3 Weight, lb			Landing Weight, lb			Ferry Weight, lb		
			CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z
28	29	103	256,357.6			202,517.6			195,531.6			194,939.6			194,789.6			194,710		
			1116.4	0.6	380.8	1104.1	0.5	374.6	1095.1	0.5	371.4	1093.7	0.5	370.9	1095.3	0.5	368.1	1128.6	0.3	372.0
29	30	104	261,118.9			201,074.6			193,349.6			192,557.6			192,459.6			193,031		
			1123.4	0.5	382.6	1106.8	0.4	374.5	1098.7	0.4	371.1	1097.3	0.4	370.6	1099.1	0.4	367.8	1130.7	0.2	371.7
30	28	102	NA/DOD			207,482.2			201,294.2			200,331.2			200,214.2			200,509.7		
						1096.7	-0.1	373.1	1089.7	-0.1	370.4	1087.8	-0.1	369.7	1089.4	-0.1	367.0	1120.5	-0.2	370.8
31	34	104	257,569.2			204,439.2			196,784.2			196,112.2			195,954.2			195,804		
			1114.2	0.4	380.8	1101.8	0.2	375.0	1094.5	0.3	371.7	1093.1	0.2	371.2	1094.7	0.3	368.5	1128.2	0.1	372.3
32	33	103	NA/DOD			203,006.2			195,185.2			194,463.2			194,282.2			195,242.7		
						1106.2	0.0	375.1	1094.1	0.1	371.1	1093.2	0.1	370.8	1094.8	0.1	368.0	1124.7	0.1	371.8
33	32	102	255,994.0			241,970.2			229,892.2			228,523.2			228,335.2			227,868.7		
			1131.3	-0.9	381.4	1096.3	-0.9	378.6	1080.8	-0.9	373.8	1078.2	-0.9	372.9	1079.6	-0.9	370.5	1108.8	-0.8	373.8
34	36	104	NA/DOD			193,208.2			188,059.2			187,316.2			187,200.2			187,944.7		
						1105.2	0.1	373.1	1096.2	0.2	370.4	1094.7	0.2	369.8	1096.4	0.2	366.9	1128.9	0.1	370.8
35	31	103	249,109.2			202,753.2			190,566.2			189,309.2			189,118.2			189,691.7		
			1114.8	-0.5	384.2	1107.2	-1.0	376.4	1090.0	-1.0	370.5	1087.9	-1.0	369.7	1089.7	-1.0	366.6	1125.1	-1.0	370.3
36	41	103	259,593.9			204,007.2			197,986.2			196,982.2			196,869.2			197,369.7		
			1115.2	-0.1	381.4	1100.4	-0.5	374.7	1090.4	-0.5	371.8	1089.4	-0.4	371.2	1091.2	-0.4	368.3	1124.4	-0.5	372.0

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			CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z
37	38	104	NA/DOD			196,781.2			191,862.2			191,409.2			191,091.2			N/A KSC LANDING		
						1106.3	0.2	372.8	1098.1	0.2	370.3	1096.2	0.2	369.9	1098.6	0.2	366.7			
38	35	102	256,385.6			236,566.2			226,613.2			225,531.2			225,329.2			223,330.7		
			1106.4	-0.5	378.1	1092.5	-0.5	375.4	1080.8	-0.5	371.4	1079.1	-0.5	370.8	1080.5	-0.4	368.4	1114.7	-0.3	371.6
39	37	104	255,824.0			201,055.2			191,569.2			190,266.2			190,098.2			190,023.7		
			1116.5	-0.3	381.7	1103.0	-0.6	375.4	1089.6	-0.6	370.9	1087.4	-0.6	370.0	1089.2	-0.6	367.0	1124.2	-0.6	370.6
40	39	103	247,373.4			218,919.2			212,806.2			211,673.2			211,512.2			N/A KSC LANDING		
			1111.1	0.0	382.5	1091.0	-0.4	376.8	1082.2	-0.3	374.1	1080.3	-0.4	373.5	1082.0	-0.4	370.8			
41	40	102	251,970.3			235,196.2			227,709.2			226,737.2			226,535.2			225,326.7		
			1100.2	-0.1	376.4	1089.5	-0.2	374.9	1081.1	-0.2	371.9	1079.6	-0.2	371.4	1080.9	-0.2	369.0	1112.9	-0.1	372.2
42	43	104	259,374.7			203,898.2			197,472.2			196,353.2			196,088.5			N/A KSC landing		
			1113.9	-0.2	380.4	1099.5	-0.3	374.2	1088.8	-0.3	371.0	1087.4	-0.3	370.3	1089.7	-0.3	367.3	N/A	N/A	N/A
43	48	103	240,062.6			204,685.2			193,665.2			192,925.2			192,780.2			193,583.7		
			1125.5	-0.9	381.9	1113.1	-0.9	375.9	1097.4	-1.0	370.6	1096.0	-1.0	370.0	1097.8	-0.9	367.0	1130.2	-0.9	371.3
44	44	104	259,904.0			204,165.2			196,229.2			195,047.2			194,818.2			194,087.1		
			1116.2	0.0	381.0	1102.6	-0.2	374.4	1092.4	-0.2	370.7	1090.8	-0.2	370.0	1092.5	-0.2	367.0	1128.6	-0.1	371.1
45	42	103	243,494.1			227,227.2			219,459.2			218,159.2			218,089.2			216,224.7		
			1104.8	-0.1	378.3	1091.4	-0.3	376.6	1082.3	-0.3	373.4	1080.6	-0.3	372.8	1082.2	-0.3	370.1	1115.6	-0.2	373.1

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			CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z
46	45	104	233,652.0			215,275.2			206,495.2			205,672.3			205,588.2			N/A KSC Landing		
			1113.1	-0.3	377.6	1100.3	-0.5	375.2	1086.3	-0.5	371.0	1085.4	-0.4	370.5	1087.2	-0.4	367.7	N/A	N/A	N/A
47	49	105	256,392.3			209,002.2			202,094.2			201,400.2			201,235.2			199,831.2		
			1119.5	-0.3	383.9	1096.7	-0.6	375.0	1085.8	-0.7	371.7	1084.4	-0.6	371.2	1086.2	-0.6	368.3	1122.7	-0.5	371.9
48	50	102	257,338.6			236,634.2			227,587.2			225,865.2			225,615.2			N/A KSC Landing		
			1106.0	-0.5	378.8	1089.7	-0.6	375.9	1079.8	-0.7	372.4	1107.7	-0.7	371.6	1079.1	-0.7	369.0	N/A	N/A	N/A
49	46	104	256,026.3			216,581.2			210,995.2			209,851.2			209,532.2			N/A KSC Landing		
			1113.8	-0.3	382.4	1087.1	-0.5	374.8	1080.2	-0.5	372.4	1078.2	-0.5	371.7	1079.6	-0.5	368.9	N/A	N/A	N/A
50	47	105	244,645.2			228,709.2			221,374.2			220,325.2			220,195.2			N/A KSC Landing		
			1103.9	-0.4	379.1	1091.1	-0.5	377.5	1085.4	-0.5	374.9	1083.7	-0.5	374.3	1085.3	-0.5	371.7	N/A	N/A	N/A
51	52	102	250,399.4			223,297.2			217,359.2			216,072.2			215,979.2			N/A KSC Landing		
			1109.5	-0.3	377.5	1090.3	-0.4	373.5	1084.5	-0.4	371.1	1082.6	-0.4	370.4	1084.3	-0.3	367.7	N/A	N/A	N/A
52	53	103	243,944.4			201,376.2			194,826.2			194,028.2			193,851.2			193,848.3		
			1112.3	0.1	380.7	1100.2	0.0	373.9	1090.4	0.1	370.5	1089.5	0.0	370.2	1091.3	0.1	367.1	1125.3	0.2	370.8
53	54	105	259,764.2			205,293.6			198,296.6			197,481.2			197,353.2			N/A KSC Landing		
			1115.7	0.3	381.2	1101.4	0.2	375.0	1093.5	0.2	371.9	1091.6	0.2	371.3	1093.4	0.2	368.4	N/A	N/A	N/A
54	56	103	237,213.0			217,922.2			209,229.2			208,052.2			207,946.2			N/A KSC Landing		
			1109.5	-0.3	379.3	1098.3	-0.5	376.9	1086.3	-0.5	373.4	1084.6	-0.4	372.5	1086.3	-0.4	369.7	N/A	N/A	N/A

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			CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z
55	55	105	255,441.8			236,094.2			228,546.6			227,484.2			227,209.2			226,360.2		
			1101.6	-0.6	377.5	1089.0	-0.6	375.4	1080.1	-0.6	372.4	1078.4	-0.6	371.9	1079.7	-0.6	369.2	1111.8	-0.5	372.3
56	57	105	252,710.1			N/A			226,573.5			225,019.5			224,906.5			N/A KSC Landing		
			1112.6	-0.1	382.9	N/A	N/A	N/A	1083.0	-0.2	375.2	1080.9	-0.2	374.6	1082.5	-0.2	372.0	N/A	N/A	N/A
57	51	103	261,486.6			N/A			208,048.5			207,042.5			206,931.5			N/A KSC Landing		
			1116.5	-0.6	381.5	N/A	N/A	N/A	1086.6	-0.8	373.5	1084.7	-0.7	373.1	1086.5	-0.7	370.3	N/A	N/A	N/A
58	58	102	256,097.0			N/A			230,447.7			229,480.7			229,368.7			229,953.7		
			1103.4	-0.4	378.0	N/A	N/A	N/A	1080.0	-0.5	373.0	1078.8	-0.5	372.7	1080.4	-0.5	370.2	1107.9	-0.6	373.7
59	61	105	250,279.1			N/A			213,640.5			212,946.5			212,835.5			N/A KSC Landing		
			1113.5	-0.1	381.6	N/A	N/A	N/A	1080.2	0.0	372.2	1078.8	0.1	371.9	1080.5	0.07	369.2	N/A	N/A	N/A
60	60	103	245,767.5			N/A			217,583.5			216,662.5			216,594.5			N/A KSC Landing		
			1104.8	-0.7	380.2	N/A	N/A	N/A	1081.2	-0.9	374.1	1079.6	-0.9	373.7	1081.3	-0.9	371.1	N/A	N/A	N/A
61	62	102	256,584.1			N/A			229,091.2			228,360.2			228,250.2			N/A KSC Landing		
			1107.4	-0.6	379.2	N/A	N/A	N/A	1084.0	-0.7	373.5	1182.6	-0.6	373.2	1084.1	-0.6	370.6	N/A	N/A	N/A
62	59	105	246,851			N/A			222,698			221,931			221,865			222,734		
			1095.8	-0.5	378.7	N/A	N/A	N/A	1090.9	-0.4	374.7	1079.6	-0.4	374.5	1081.2	-0.4	371.9	1109.1	-0.6	375.5
63	65	102	258,585			237,613			230,624			229,410			229,307			N/A Landed at KSC		
			1104.2	-0.2	378.8	1087.4	-0.6	375.6	1080.7	-0.6	373.0	1079.0	-0.6	373.0	1080.1	-0.6	370.0	N/A	N/A	N/A

NA/DOD = Not Available/Department of Defense Mission

Source: JSC/VF Orbiter Mass Properties Summary

STS-1 and subsequent mission.

SHUTTLE FLIGHT HISTORIES

ORBITER MASS PROPERTIES

Miss. Seq. No.	STS- No.	Orb. OV-	Lift-off Weight, lb			Pre-Deorbit burn Weight, lb			Entry Interface Weight, lb			Mach 3 Weight, lb			Landing Weight, lb			Ferry Weight, lb		
			CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z	CG X	Y	Z
64	64	103	240,884			221,336			213,510			212,565			212,141			212,251		
			1105.5	-0.5	379.5	1090.1	-0.7	376.8	1083.7	-0.8	373.5	1082.0	-0.8	373.1	1083.9	-0.7	370.4	1117.1	-0.5	373.8
65	68	105	247,136			228,874			222,752			221,460			221,571			221,390		
			1099.1	-0.5	378.5	1087.8	-0.4	376.8	1080.1	-0.4	374.3	1078.1	-0.4	373.7	1080.3	-0.4	371.4	1112.2	-0.4	374.6
66	66	104	243,089			221,520			212,378			211,434			211,327			210,966		
			1113.0	-0.1	379.5	1096.8	-0.1	375.9	1085.9	-0.1	371.9	1084.3	-0.1	371.6	1086.0	-0.1	368.9	1120.1	0	372.4
67	63	103	247,555			224,130			213,717			212,772			212,646			N/A Landed at KSC		
			1111.1	-0.2	382.2	1095.7	-0.5	378.4	1081.4	-0.6	373.9	1079.7	-0.5	373.5	1079.3	-0.5	373.6	N/A	N/A	N/A
68	67	105	256,293			231,034			218,563			217,568			217,481			216,663		
			1118.0	0.0	381.5	1101.4	-0.0	377.5	1084.1	-0.0	372.0	1082.5	-0.0	371.6	1083.1	0.0	371.9	1117.9	0.0	372.9

NA/DOD = Not Available/Department of Defense Mission

Source: JSC/VF Orbiter Mass Properties Summary
 STS-1 and subsequent mission.